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[54] **DISENGAGEMENT MECHANISM FOR A FRICTION CLUTCH**

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[58] **Field of Search** ..... 192/995, 109 R, 192/91 R, 98, 89.24

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,186,828	2/1980	Renaud	192/98
4,648,500	3/1987	Parzefall	192/99 S
4,773,516	9/1988	Parzefall	192/30 V
4,821,858	4/1989	Kabayama	192/91 R
4,830,162	5/1989	Kuno	192/98
4,832,166	5/1989	Parzefall	192/98
5,009,300	4/1991	Romig	192/98
5,012,911	5/1991	Kabayama	192/89.24
5,785,164	7/1998	Hanique et al.	192/99 S

FOREIGN PATENT DOCUMENTS

2 596 477	3/1987	France	F16D 13/38
38 10 369	10/1989	Germany	F16D 23/14
297 00 508	5/1997	Germany	F16D 23/14
2 157 791	4/1985	United Kingdom	F16D 23/14
2 196 086	4/1988	United Kingdom	F16D 23/14
2 219 059	11/1989	United Kingdom	F16D 23/14
2 246 181	1/1992	United Kingdom	F16D 23/14
2 311 352	9/1997	United Kingdom	F16D 25/14

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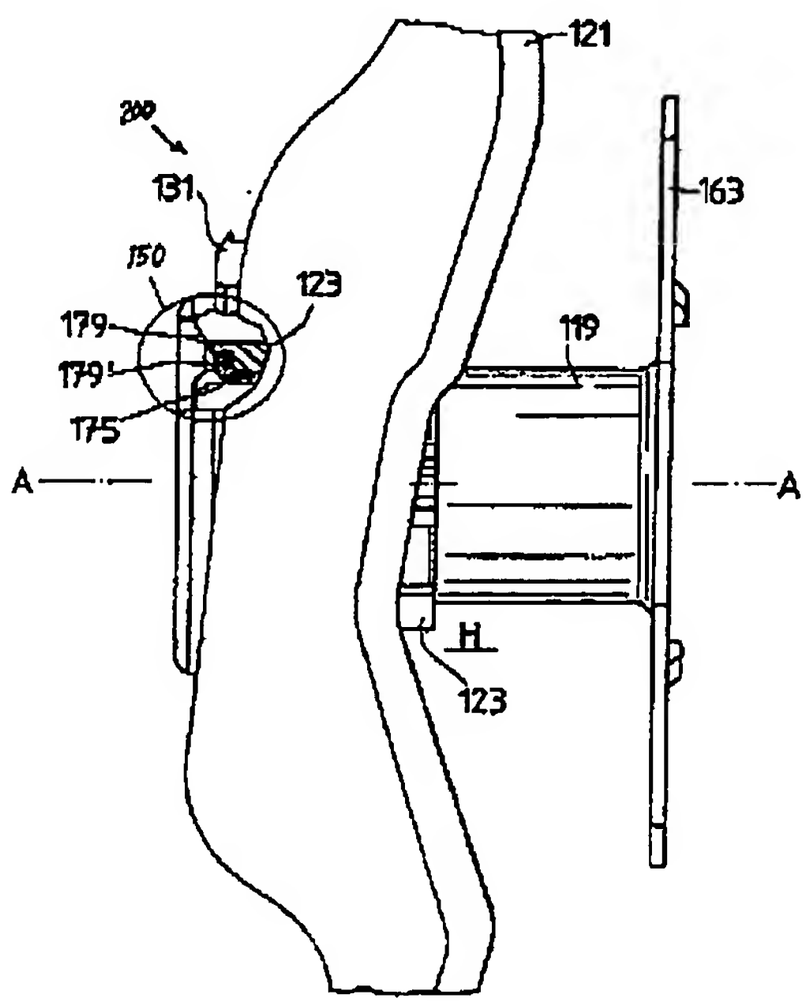
[57] **ABSTRACT**

A disengagement mechanism for a friction clutch which is to be arranged between an internal combustion engine and a transmission flanged to the internal combustion engine by a casing includes a guide pipe fastenable in the casing. A release bearing element is guided radially at the outer circumference of the guide pipe so as to be axially movable thereon. The disengagement mechanism also includes a clutch lever which is to be articulated at the casing for transmitting clutch actuating forces to the release bearing element. At least the guide pipe, the release bearing, and the clutch lever are held together to form a constructional unit prior to their arrangement between the internal combustion engine and the transmission by movement limiting device, thereby facilitating the assembly of the disengagement mechanism. In the operation-ready, installed state, the movement limiting devices influences the movability of the disengagement mechanism.

14 Claims, 7 Drawing Sheets



519 and a bearing support 523. Proceeding from the side closest to the transmission, catch hooks 568 are inserted through openings 566 in the guide pipe flange 563 which are distributed circumferentially. The catch hooks 568 are connected with one another on the transmission side by a ring 570 forming one integral piece. The catch hooks 568 penetrate axial holes 522 of the clutch lever 521 which are aligned with openings 566 and penetrate axial holes 524 in the flange 527 of the bearing support 523 which are likewise aligned therewith. The axial holes 524 of the bearing support 523 contain catch faces 524' normal to the axis for the catch hooks 568. In the locked state of the constructional unit, the clutch lever 521 is held between the flange 527 of the bearing support 523 and the guide pipe flange 563 so as to be nondetachable and substantially free from play. To prevent play between the parts, a transmission-side continuation 526 of the bearing support 523 penetrates the hole 522 of the clutch lever 521 and contacts the guide pipe flange 568. This position may correspond to the completely worn position of the clutch. The locking is canceled the first time the clutch is actuated toward the axial stroke region H of the bearing support 523 to be utilized during clutch actuation, i.e., toward the left in 10 and 11. As in FIGS. 6 and 7, the construction unit 500 may also be locked again in case of repairs to the clutch.

FIGS. 12 and 13 show a construction unit 600 similar to construction FIGS. 10 and 11, wherein, however, catch hooks 668 project in one piece from a supporting continuation 262 of a bearing support 623 toward the transmission side and penetrate holes 622 of the clutch lever 621 and openings 666 of the guide pipe flange 663 so as to extend through the latter on the transmission side. As in FIGS. 10 and 11, the catch hooks may be locked in a reversible manner or, as is shown, may have a predetermined breaking location 670 along which the hook 668 breaks off when the clutch is first actuated.

The predetermined breaking location 670 extends in the plane of separation between the clutch lever 621 and the guide pipe flange 663. This prevents the broken off residual hook 668 from blocking engagement when the clutch is close to the fully worn state in which the break surfaces of the predetermined breaking location 670 approach one another again when the clutch is engaged.

FIGS. 14 and 15 show schematically a clutch-side non-positive locking or frictional locking between a guide pipe 719 and bearing support 723. An inner circumferential surface 723' of the bearing support cooperates in a nonpositive engagement with an external circumferential surface 719' of the guide pipe 719. Under the influence of the clutch plate spring 15, the bearing support 723 is displaced toward the right as viewed in FIGS. 14 and 15. In so doing, the clutch-side end face 724 of the bearing support 723 slides over a step 720 of the guide pipe 719, which step 720 springs inward radially and limits the friction surface 719' of the guide pipe toward the transmission side, so that the bearing support 723 is released toward the right with reference to FIG. 14 toward the axial stroke region H to be utilized during engagement of the clutch.

FIGS. 16 and 17 show another embodiment of a construction unit 800 having nonpositive/frictional locking between a guide pipe 819 and a bearing support 823 near a guide pipe flange 863. An inner circumferential surface 823' close to the transmission-side end of the bearing support 823 enters into a frictional engagement with an outer circumferential surface 819' of the guide pipe 819. The outer circumferential surface 819' is limited toward the clutch side by a step 820 which springs inward radially. The portion carrying the

friction surface 823' of the bearing support 823 penetrates an opening 822 of a clutch lever 821. Accordingly, in the locked state, the clutch lever 821 is held tightly between a flange 827 of the bearing support 823 and the guide pipe flange 863. The first time the clutch is activated, the bearing support is moved away from the transmission by the clutch lever 821. When a transmission-side end face 824 of the bearing support moves over the step 820 of the guide pipe, the locking of the elements is canceled.

FIG. 18 shows another construction of a clutch lever 921 similar to the construction of FIG. 1 in which, however, protuberances 950 project from both longitudinal edges of an elongated hole 949 for receiving the bearing support sleeve. The protuberances 950 project inward radially toward one another and enter recesses 130 of the bearing support 123 (see FIGS. 2 and 3), these recesses 130 being limited in the longitudinal direction of the clutch lever 921. The protuberances 950 limit a movement of the clutch lever 921 in its longitudinal direction relative to the bearing support 123, but allow a slight play in this longitudinal direction and enable a tilting of the clutch lever relative to the bearing support 123 about an axis normal to the axis of rotation A—A and orthogonal to the longitudinal direction of the clutch lever. The surface 930 which is shaded in FIG. 18 shows a pressing surface for contact at the axially projecting bulges 161 of the bearing support 123 (see FIG. 2).

The invention is not limited by the embodiments described above which are presented as examples only but can be modified in various ways within the scope of protection defined by the appended patent claims.

What is claimed is:

1. A disengagement mechanism for a friction clutch which is arranged in a motor vehicle between an internal combustion engine and a transmission flanged to the internal combustion engine by a casing and is rotatable about an axis of rotation, the disengagement mechanism comprising:

a release bearing element;

a guide pipe fastenable in the casing coaxially to the axis of rotation so as to axially penetrate said release bearing element, said release bearing element being axially movably guided on said guide pipe within an axial stroke region, said axial stroke region comprising an operative movement area of said release bearing element;

a clutch lever operative for transmitting clutch actuating forces to said release bearing element, wherein at least said release bearing element said guide pipe, and said clutch lever are connected together to form a construction unit prior to installation in the motor vehicle;

joint means operatively arranged such that said clutch lever is swivelably connectable to the casing via said joint means;

said construction unit comprising a first component and a second component selected from the group consisting of said guide pipe, said clutch lever, and said release bearing element; and

a movement limiting means detachably locking said first component and said second component under the influence of an axial overcoming force, so that said release bearing element is within said axial stroke region when said first and second components are detachably locked by said movement limiting means, wherein said movement limiting means comprises a holding force sized such that said first and second components are unlockable by an overcoming force applied by one of a main